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Human Papillomavirus Vaccine:

2-1-1 Helplines and Minority-Parent Decision-Making

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Abstract

Background—Research is needed to understand parental factors influencing human papillomavirus (HPV) vaccination, particularly in groups with a higher burden of cervical cancer.

Purpose—To determine correlates of HPV vaccination among a sample of low-income parents of age-eligible daughters (aged 9–17 years) who called the 2-1-1 Helpline. Secondary analyses describe potential differences in HPV vaccination correlates by Hispanic and black parent groups, specifically.

Methods—This 2009 cross-sectional feasibility survey of cancer prevention needs was conducted in Houston at the 2-1-1 Texas/United Way Helpline. In 2012, to examine the association between parental psychosocial, cognitive, and decisional factors and HPV vaccination uptake (one or two doses), bivariate and multivariable logistic regression analyses were conducted for minority parents and for Hispanic and black parent groups, separately.

Results—Lower rates of HPV vaccination uptake were reported among minority daughters of 2-1-1 callers (29% overall) compared with national and Texas rates. In final adjusted analysis, factors positively associated with HPV vaccination uptake included being offered the vaccination by a doctor or nurse, belief that the vaccine would prevent cervical cancer, and Hispanic ethnicity. Secondary analyses detected differences in factors associated with vaccination in Hispanic and black groups.

Conclusions—Findings indicate low levels of vaccination among 2-1-1 callers. Increased understanding of determinants of HPV vaccination in low-income minority groups can guide interventions to increase coverage. Because 2-1-1 informational and referral services networks reach populations considered medically underserved, 2-1-1 can serve as a community hub for informing development of and implementing approaches aimed at hard-to-reach groups.

Introduction

In 2012, a total of 12,170 U.S. women are expected to be diagnosed and 4220 deaths are expected from cervical cancer.¹ Compared with non-Hispanic whites (NHWs), Hispanic and

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black women have higher cervical cancer incidence rates (70% and 39% higher than NHWs, respectively), and higher mortality rates (48% and 100% higher than NHWs, respectively).^{2, 3} Vaccination against human papillomavirus (HPV) provides an important prevention tool to help decrease cervical cancer in medically underserved populations. Although HPV does not pose a health problem for most people, persistent HPV infection is the primary cause of cervical cancer. For girls and young women (aged 9–26 years), recommended HPV vaccination can prevent infection from high-risk types that cause an estimated 70% of cervical cancers.^{4, 5}

Since HPV vaccination recommendations were established, few studies have examined parental factors influencing vaccination uptake (one or two doses) among low-income minority populations. In a 2007 review of HPV vaccine acceptability among U.S. parents, Brewer and Fazekas⁶ identified 28 studies and reported that parents found the vaccine acceptable if (1) they believed it was effective; (2) a physician recommended it; and (3) they felt that the risk of HPV infection was likely. One study reported predictors of vaccine acceptability by race and ethnicity, and found no differences.⁷

In a 2010 review of parents HPV vaccination acceptability, Fernandez et al.⁸ found parent populations had low knowledge of HPV, high willingness to vaccinate daughters (70%–85%), and varying acceptance of the vaccine related to health beliefs and attitudes. The Fernandez review also highlighted the dearth of studies examining differences in acceptability of vaccination across racial/ethnic groups.⁸ Since these reviews, additional studies conducted in the U.S. have examined racial/ethnic minority parents' HPV and HPV vaccination knowledge and awareness,^{9, 10} attitudes and beliefs regarding HPV vaccination,^{9–12} and provider-related recommendations.^{9, 12}

Because 2-1-1 helplines represent a unique opportunity to reach large numbers of medically underserved people,¹³ the current study examined parent-level factors associated with vaccination among a low-income minority population. This study also assessed the feasibility of partnering with the 2-1-1 Texas/United Way Helpline to conduct a cancer needs assessment survey of callers. Results from this feasibility study will inform larger studies, and ultimately, intervention program strategies that could be implemented through a 2-1-1 helpline-based program.

To identify parent-level factors associated with HPV vaccination in groups with a higher burden of cervical cancer, a survey was conducted of low-income parents of daughters (aged 9–17 years) identified through the Greater Houston Area 2-1-1 Helpline. This helpline serves primarily socioeconomically and medically vulnerable people seeking information to help meet basic needs (e.g., assistance with food, medical/prescriptions, utilities, or shelter).^{13,14} To understand correlates of HPV vaccination among minority parents, this study described minority parent-level correlates of HPV vaccination of daughters, and explored correlates of HPV vaccination by Hispanic and black groups separately.

Methods

The 2-1-1 Helpline Center and Study Participants

This cross-sectional HPV vaccination study was embedded in a larger cancer prevention pilot study conducted during a 6-week period (September to October 2009). The larger survey assessed cancer prevention needs of 2-1-1 callers in collaboration with the 2-1-1 Texas/United Way Helpline. Nationally, 2-1-1 helplines are staffed with professional information and referral specialists (specialists), trained to respond to callers' needs using computerized referral databases of local and affordable health and social services. The United Way of Greater Houston 2-1-1 serves a 13-county area, and received over 732,500

calls for help in 2009.¹⁴ In addition, many nonprofit and governmental agencies work with 2-1-1 Texas and the United Way to identify services to help their clients.

Standard procedures for 2-1-1 calls were followed, in which all calls randomly come into the 2-1-1 helpline and are answered by the next available specialist, who assesses callers' needs and provides community referrals. After completing these standard 2-1-1 procedures, ten specialists transferred all eligible callers to the designated specialists, depending on their availability to take the call. Two of the dedicated specialists, trained to implement the study consent and survey protocols, consented and surveyed callers. This protocol helped to manage overflow so that callers were not waiting a long time on the phone to answer survey questions. This protocol ensured that all eligible callers had an equal chance of being invited, helping to achieve recruitment of a random group of callers.

Callers were eligible if they were aged 18 years, spoke English or Spanish, called from within the targeted service area, were not in distress, and did not call on behalf of another adult. For this study, additional criteria included having a daughter aged 9–17 years and being self-identified as Hispanic or black. Responses were entered directly into a web-based survey, and responses were recorded anonymously. No study incentives were offered for participation. Parents with girls aged 9–17 years who needed HPV vaccination(s) were referred to clinics offering vaccination through the Texas Vaccines for Children Program. The University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects approved the study protocol and procedures.

Measures

This study's primary outcome variable was HPV vaccination uptake, defined as having one or two HPV vaccines. Daughters' HPV vaccination status was assessed through parent report. Next, sociodemographic, economic, and psychosocial constructs were assessed. A set of 26 HPV questions were developed and pretested by the Cancer Prevention and Control Research Network (CPCRN) workgroup through cognitive interviewing methods,¹⁵ and integrated into the 2-1-1 pilot survey. Hypothesized correlates of HPV vaccine uptake were identified through existing literature and guided by the integrated theoretic model described by Fishbein.¹⁶

While this study did not propose to test a conceptual model, variable selection was informed by the conceptual framework of HPV vaccination proposed in the Fernandez review.⁸ The framework describes the influence of environmental factors on behavior, with environmental including personal, organizational and community/society-related factors.⁸ For the present study, item analysis was conducted on the 26 items identified. Data analyses were conducted in 2012. After eliminating items with little variance and those with low item-total correlations, the scale consisted of 16 items: HPV knowledge and perceptions (five items; heard of HPV, heard of the vaccine, believes HPV can cause cervical cancer, believes it can be passed through sexual contact, believes the vaccine is most effective when given before initiation of sexual activity); social norms (one item; other parents in my community have their daughters receive the vaccine); barriers/benefits to vaccination (four items; if my daughter gets the vaccine it may cause future health problems, getting the vaccine may cause problems getting pregnant later, if my daughter gets the vaccine she may be more likely to think it's okay to have sex, your daughter getting the vaccine would be a good idea); severity/susceptibility (two items; compared to other girls, what are your daughter's chances of getting HPV; getting HPV would be a serious problem for your daughter); and vaccine efficacy (two items; how effective is the vaccine at preventing HPV, how effective is the vaccine at preventing cervical cancer).

Provider-related factors included two items (daughter offered the vaccine by doctor or nurse and discussed the vaccine with daughter's doctor). The final subset of 16 HPV-related questions included psychosocial and decisional (parent-provider communication) constructs. Tables 1–3 include response scales for items.

Data Analyses

Chi-square analyses were used to describe parents' overall sociodemographic, and HPV-related psychosocial constructs. In secondary analysis, outcomes were examined by Hispanic and black parent groups, separately. The primary analysis examined associations between independent variables and HPV vaccination uptake for all participants combined.

Bivariate analyses with p -value <0.10 was used as the criterion to select variables for multivariable analyses. Variables selected for the final model were tested for multicollinearity. Any predictors with low tolerance and high variance inflation factors were dropped from the model. In multivariable analyses, odds of daughter's vaccination were estimated using a stepwise logistic regression, adjusted by factors significantly associated with HPV vaccination initiation in unadjusted analyses (p -value <0.10) after ruling out multicollinearity.

A secondary analysis described correlates of HPV vaccine uptake separately for Hispanics and black parents. Bivariate analyses with p -value <0.10 was used to select variables for the multivariable model and multivariable analyses for each group (Hispanic and black parents). All data analyses were conducted using SPSS 19.

Results

A total of 99 parent participants reported having a daughter aged 9–17 years living at home with them, 90% of whom reported their race/ethnicity. The majority of parents identified as Hispanic or black (47% and 43%, respectively), only 3.4% reported non-Hispanic white ethnicity, and 7% identified as Other. Most parents participating were women ($n=73$; 91%), and 43% of parents reported having no health insurance.

Among the Hispanic parents, 45% completed the survey in Spanish. Overall, 29% of girls had received at least one HPV vaccination, 31% ($n=13$) of Hispanic and 26% ($n=10$) of black preadolescent/ adolescent daughters. This difference was not significant ($\chi^2(1)=0.209$, $p=0.65$). Only 7.5% of girls received all three doses ($n=2$ in the black sample; $n=4$ in the Hispanic sample).

Correlates of Human Papillomavirus Vaccination Among All Parents

Overall, among all parents, eight factors were positively associated with daughter's HPV vaccination status in unadjusted bivariate analyses ($p<0.10$): heard of HPV, heard of HPV vaccine, belief that the vaccine will prevent cervical cancer, belief that the vaccine was most effective before onset of sexual activity, belief that having daughter vaccinated would be a good idea, compared to other girls daughter has more chance/about the same chance of getting HPV, whether they had discussed the vaccine with daughter's doctor, and whether a doctor or nurse offered the vaccine. Belief that the vaccine may cause future health problems was negatively associated with vaccination in adjusted analysis (Table 1).

Due to multicollinearity, two variables were dropped: belief that having daughter vaccinated would be a good idea and belief that the HPV vaccine may cause future health problems. The following variables were statistically and positively associated with vaccination uptake in multivariable analysis: being offered the vaccination by a doctor or nurse, belief that the vaccine would prevent cervical cancer, and Hispanic ethnicity (Table 2).

Human Papillomavirus Vaccination Correlates by Hispanic and Black Parent Groups

Within the Hispanic group, four factors were positively associated with daughter's vaccination status in unadjusted bivariate analyses ($p < 0.10$): heard of HPV vaccine, belief that the vaccine was most effective before onset of sexual activity, having discussed the vaccine with their daughter's doctor, and having been offered the vaccine by a doctor or nurse. However, in the fully adjusted model, whether a daughter was offered the HPV vaccine by a doctor or nurse was the only significant determinant of daughter's vaccination status (Table 3).

Within the black group, four factors were positively associated with daughter's vaccination status in unadjusted bivariate analyses ($p < 0.10$): perceived efficacy that the vaccine would prevent cervical cancer, perceived susceptibility of daughter getting HPV compared with other girls, whether they had discussed the vaccine with their daughter's doctor, and whether they had been offered the vaccine by a doctor or nurse. Belief that getting the vaccine might cause future health problems for their daughter was negatively associated with daughters' uptake of HPV vaccine. Due to high multicollinearity, belief that HPV prevents cervical cancer was dropped. In the fully adjusted model for black parents, discussing the vaccine with their daughters' doctors was a significant and positive determinant, while belief that the vaccine could cause future health problems was a significant and negative determinant of daughter's vaccination uptake (Table 3).

Discussion

Human papillomavirus vaccination uptake rates overall (29%), and among Hispanic (31%) and black (26%) girls, were similar to HPV vaccination uptake rates among Hispanic (33%) and black girls (24%) reported in a Los Angeles–based study conducted in a low-income minority population.¹⁰ In the current final adjusted multivariable analysis, Hispanic ethnicity, provider recommendation, and perceived efficacy of the vaccine to prevent cancer all increased the odds of daughters' vaccination. Among Hispanic parents, having a health provider offer the vaccine was the only correlate of HPV vaccination. Among black parents, discussing the HPV vaccine with their daughters' doctor increased the odds of vaccination, while belief that the vaccine may cause future health problems decreased vaccination odds.

In the current study, the association found between a healthcare provider's recommendation and uptake of HPV vaccination may have important implications for future interventions. For example, while 74% of Hispanic and 64% of black parents reported they would have their daughter vaccinated if a doctor recommended it, only 31% of Hispanic and 40% of black parents reported a health provider recommendation. In addition, lower proportions of Hispanics (26%) than blacks (42%) reported discussing the HPV vaccine with their daughter's provider.

The potential influence of healthcare providers highlights an opportunity to increase vaccination rates in underserved populations through recommendations delivered by alternative sources, such as information and referral specialists at 2-1-1 helplines. This type of innovative approach could help reduce barriers to receiving recommendations and increase use of preventive services. Larger studies are needed to corroborate the current findings.

The current findings are similar to previous research that examined factors associated with daughters' HPV vaccine uptake in minority populations.^{9, 10, 12} Bastani et al.¹⁰ also reported parent awareness (having heard of HPV) as a correlate of HPV vaccine uptake. Reiter et al.¹² examined minority parental factors associated with HPV vaccination initiation, and similar to the current findings, reported that perceived harm of the vaccine was negatively

associated with vaccination initiation.¹² While the Reiter study found that among the black subgroup, daughters had a higher odds of initiating the HPV vaccine if the doctor recommended it (versus not recommending), this finding differs slightly from the current finding, in which discussion of vaccination with a doctor, rather than recommendation, was positively associated with HPV vaccination initiation.

Study strengths include a demonstration of the feasibility of using 2-1-1 helplines to understand the health needs of hard-to-reach, low-resource, and medically underserved minority populations. The collaborative effort with the Greater Houston 2-1-1 Helpline provided access to a socioeconomically disadvantaged population and enabled in-depth examination of their HPV vaccination behaviors. Moreover, implementation of this telephone-based survey to both English and Spanish speakers increased access to hard-to-reach low-literate and Spanish-speaking-only populations. Future studies, including prospective studies, in larger low-income Hispanic and black populations are needed to further understand potential culturally or economically mediated barriers and facilitators that influence HPV vaccination.

Limitations of the study include self-report measures, study design and small sample size, which limit generalizability. Because it is a cross-sectional study, no causality of associations may be inferred. Greater statistical power would have increased the ability to detect differences between constructs and HPV vaccination outcomes, and differences between the two minority groups. A known limitation of using self-report measures is the possibility of socially desirable answering. An effort was made to control for this by ensuring anonymity, and participation did not require follow-up information to be obtained from callers.

Due to the inherent nature of calls, the low participation rate was an expected limitation. Many callers needed to address pressing problems and had limited time to participate in the survey (e.g., were on lunch break or with children). No examination was made of information on daughter age-specific barriers to vaccination decision-making due to the small sample. However, understanding differences by age of daughter would be important as prior studies have shown greater reluctance by parents to vaccinate younger daughters.^{17, 18}

Finally, it was not possible to examine completion of the three-dose vaccine series as an outcome due to low vaccination uptake in this population. Both initiation and completion outcomes are important. The uptake of at least one dose is important to understand issues of vaccination acceptance and barriers, for example. Larger studies are needed to understand the various predictors of completion of the three-dose series.

This survey served as a feasibility study to understand potential for future collaborations with the 2-1-1 helpline. In a 6-week period, 375 participants were reached and surveyed, 80 of whom were Hispanic and black parents of adolescent daughters. Based on ability to integrate this cancer risk assessment survey into 2-1-1-calls, this work has been built on to conduct a 2-1-1 information and referral specialist-delivered cancer prevention project consisting of a risk assessment and referrals for affordable prevention services across multiple behaviors (e.g., mammography, colorectal cancer screening, Pap, and HPV vaccination).

Ultimately, given the high volume of 2-1-1 callers with self-identified basic needs, a cancer prevention program integrated into the Greater Houston 2-1-1 Helpline system has the potential to deliver health prevention messages and support to help connect large numbers of medically underserved callers to cancer prevention services. The collaborative effort targets vulnerable groups who have increased barriers to primary health care (e.g., lack of health insurance)¹⁹, and consequently less opportunity to receive doctors' recommendations for

preventive screenings or vaccination. This collaborative effort between public health researchers and the Greater Houston 2-1-1 Helpline system demonstrates a potential to be replicated in other 2-1-1's across Texas and nationally.

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Table 1

Significant Bivariate Predictors of Parent-Level Factors Related to Daughters' HPV Vaccination Uptake, n=80

| Bivariate factors | 2-1-1 callers | |
|---|-----------------|----------------------|
| | <i>p</i> -value | OR (95% CI) |
| Awareness | | |
| Heard of HPV vaccine or Gardasil, ^a Yes | 0.02 ** | 12.30 (1.48, 102.30) |
| Heard of HPV, ^a Yes | 0.05 ** | 3.68 (0.97, 13.97) |
| Knowledge | | |
| Believes HPV vaccine is most effective when given, ^b ... Before a girl initiates sexual activity | 0.07 * | 2.48 (0.90, 6.83) |
| Perceived efficacy of the HPV vaccine | | |
| Effectiveness of the HPV vaccine at preventing cervical cancer, ^c Effective | 0.007 *** | 7.21 (1.72, 30.21) |
| Perceived susceptibility | | |
| Compared to other girls, your daughter's chances of getting HPV, ^d | 0.07 † | 2.66 (0.91, 7.73) |
| More/about the same risk as other girls | | |
| Barriers/benefits | | |
| The HPV vaccine may cause future health problems, ^e agree | 0.08 † | 0.29 (0.07, 1.60) |
| Your daughter getting the HPV vaccine would be a good idea, ^e Agree | 0.04 ** | 1.20 (1.41, 1.98) |
| Provider communication | | |
| Discussed the HPV vaccine with daughter's doctor, ^a Yes | 0.001 ***** | 25.81 (6.16, 108.25) |
| Provider recommendation | | |
| Doctor or nurse offered HPV vaccine, ^a Yes | 0.001 ***** | 27.26 (6.84, 108.50) |

*
<0.10**
<0.05***
<0.01****
<0.001^a 0=no/don't know, 1=yes^b 0=after a girl starts having sex/doesn't matter; 1=before a girl starts having sex^c 0=Not effective; 1=Effective/somewhat effective.^d 0=less chance than other girls; 1=more chance/same chance as other girls^e 0=disagree/don't know; 1=agree

Table 2

Multivariable model of parent-level factors related to daughters' HPV vaccination uptake

| Multivariable factors | Hispanic/black 2-1-1 callers | |
|--|------------------------------|-----------------------|
| | <i>p</i> -value | OR (95% CI) |
| Ethnicity | | |
| Hispanic ^a | 0.05 * | 5.56 (1.01, 30.66) |
| Provider recommendation | | |
| Doctor or nurse offered HPV vaccine, ^b Yes | 0.000 *** | 84.94 (8.74, 825.43) |
| Perceived efficacy of the HPV vaccine | | |
| Effectiveness of the HPV vaccine at preventing cervical cancer, ^c effective | 0.002 ** | 106.7 (5.58, 2041.63) |

*
<0.05**
<0.01***
<0.001^a
0=black; 1=Hispanic^b
0=no/don't know, 1=yes^c
0=Not effective; 1=Effective/somewhat effective.

Table 3

Hispanic and black parent-level factors related to daughters' HPV vaccination uptake

| Bivariate factors | Hispanic (n=42) | | Black (n=38) | |
|---|-----------------|-----------------------|--------------|----------------------|
| | p-value | OR (95% CI) | p-value | OR (95% CI) |
| Awareness | | | | |
| Heard of HPV vaccine or Gardasil, ^a Yes | 0.04 ** | 9.43 (1.06, 84.04) | ns | — |
| Knowledge | | | | |
| Believes HPV vaccine is most effective when given, ^b ... Before a girl initiates sexual activity | 0.10 * | 3.33 (0.81, 13.67) | ns | — |
| Perceived HPV vaccine efficacy | | | | |
| Effectiveness of the HPV vaccine at preventing cervical cancer, ^c Effective | ns | — | 0.002 *** | 19.50 (2.87, 32.41) |
| Perceived susceptibility | | | | |
| Compared to other girls, your daughter's chances of getting HPV, ^d More/about the same risk as other girls | ns | — | 0.03 ** | 5.83 (1.20, 28.37) |
| Barriers | | | | |
| The HPV vaccine may cause future health problems, ^e Agree | ns | — | 0.04 ** | 0.10 (0.01, 0.87) |
| Provider communication | | | | |
| Discussed the HPV vaccine with daughter's doctor, ^a Yes | 0.001 **** | 25.00 (3.84–162.99) | 0.004 *** | 27.00 (2.89, 52.62) |
| Provider recommendation | | | | |
| Doctor or nurse offered HPV vaccine, ^a Yes | 0.000 **** | 62.50 (7.71–506.66) | 0.006 *** | 12.00 (2.04, 70.45) |
| Multivariable adjusted model | Hispanic (n=42) | | Black (n=38) | |
| | p-value | OR (95% CI) | p-value | OR (95% CI) |
| Provider recommendation | | | | |
| Doctor or nurse offered HPV vaccine, ^a Yes | 0.000 **** | 110.00 (8.90, 359.17) | ns | — |
| Provider communication | | | | |
| Discussed the HPV vaccine with daughter's doctor, ^a Yes | ns | — | 0.01 *** | 30.36 (2.80, 328.60) |
| Barriers | | | | |
| The HPV vaccine may cause future health problems, ^e Agree | ns | — | 0.04 ** | 0.50 (0.01, 0.96) |

*
<0.10**
<0.05***
<0.01****
<0.001

^a0=no/don't know, 1=yes

^b0=after a girl starts having sex/doesn't matter; 1=before a girl starts having sex

^c0=Not effective; 1=Effective/somewhat effective.

^d0=less chance than other girls; 1=more chance/same chance as other girls

^e0=disagree/don't know; 1=agree

ns, not significant